Saskatchewan Ministry of Agriculture

CROP PRODUCTION

CROP PRODUCTION NEWS

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PRODUCTION

Editor's Comments

Ray McVicar, Crop Development Branch (ray.mcvicar@gov.sk.ca)

Once again, June has started off with unsettled weather. Some regions have received much-needed rain, so let's hope this is the start to improved moisture conditions for crop and livestock producers. For an update on the progress of Saskatchewan's crop throughout the growing season, check out the Saskatchewan Ministry of Agriculture *Weekly Crop Report* at: www.agriculture.gov.sk.ca/Crop-Report

Spotty crop emergence due to poor soil moisture conditions and cool temperatures has been reported, and some reseeding has taken place. Cutworm is the most reported insect pest so far this growing season. There are a number of different cutworm species attacking crops in recent years. Check out the update on cutworms in this edition of the CPN.

For information on crop protection products, check out the *Guide to Crop Protection 2008*. The spring update is also available at the same site: www.agriculture.gov.sk.ca/Guide_to_Crop_Protection. The update provides information on products registered since the guide was published in January.

Crop samples are coming in to the Crop Protection Laboratory. So far, most problems have been caused by environmental conditions. For information on how to submit a sample to the lab, look at the Saskatchewan Agriculture website at: www.agriculture.gov.sk.ca/programs-services - and scroll down to Crop Protection Laboratory Services.

NOTE: Throughout this document you will see that some publications are in blue font and underlined, indicating links to website information. If you are reading this off your computer screen, press the CTRL button and click your cursor on the link to take you directly to the website. ✪

The ***Crop Production News*** is a biweekly publication prepared primarily by provincial specialists with the Crop Development Branch of the Saskatchewan Ministry of Agriculture. The newsletter includes a compilation of articles related to entomology, plant pathology, weed science, soils and agronomy issues.

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INSIDE

Crop Protection Lab Update....2
Correcting In-Crop Sulphur Deficiencies....2
Forage Crop Production Outlook 2008....4
Ug99 Stem Rust Update....5
Management of Fungicide Resistance in Chickpea....6
Weed Control When the Pre-emergent Treatment is Missed....8
Organic Weed Control....10
Downy/Japanese Brome Update....11
Cutworm Update....13
Weed Control in Clearfield Lentil....13

Crop Protection Lab Update

By Grant Holzgang, Supervisor, Crop Protection Laboratory (CPL)

Field crop samples from the 2008 growing season are now being received at the Crop Protection Laboratory, and so far the most frequently occurring issues are due to environmental impacts.

In the drier regions of the province, the lack of top soil moisture has resulted in germination and emergence issues. Germination may have not occurred, or may have commenced and stopped, resulting in low population counts. Where the seed has been placed into moisture, germination may occur but the developing shoot may burn in the dry upper soil layer. Some seedlings emerged and were exposed to strong winds and sand blasting. Bending in the wind, particularly for sensitive broadleaf crops, may then expose tissues to 'sunburn'. Additionally, the wind causes abrasion at the soil line. The end result is heat canker (Figure 1) and/or rupture of tissues resulting in necking at or near the soil line. This pinched area usually appears white to light tan in comparison to the healthy tissue above and below. When severe, tissue above this point dies. In less severe cases, the plant struggles on, but the weakened base makes it more susceptible to breakage. The only disease that causes similar symptoms is Pythium neck rot, but this only occurs under high moisture conditions and is unlikely under present conditions. ☼

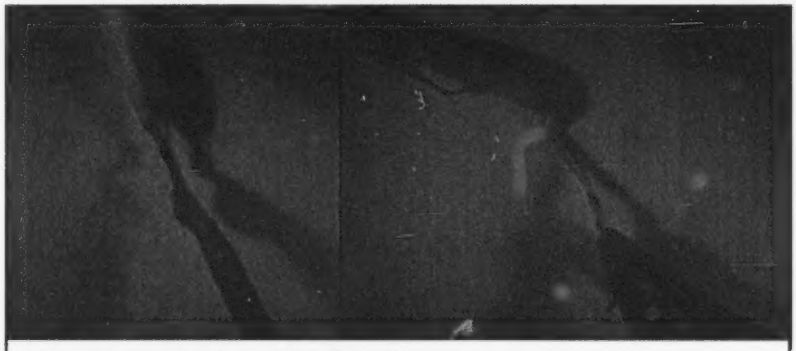


Figure 1. Heat canker on lentil seedling
Source: Crop Protection Laboratory

Correcting In-Crop Sulphur Deficiencies for Canola and Mustard

By Ken Panchuk, Provincial Specialist, Soils

Plants use sulphur in the sulphate form. A sulphur deficiency at any growth stage of canola can cause considerable reduction in yield because sulphur, unlike nitrogen and phosphorus, is not mobile within the plant tissue. Therefore, a supply of plant-available sulphur is required from emergence to completion of the seed-filling stage.

(Continued on page 3)

Correcting In-Crop Sulphur Deficiencies for Canola and Mustard
(Continued from page 2)

If sulphur deficiencies are not adequately corrected as part of the seeding plans for canola and mustard, then in-crop action must be taken as soon as sulphur deficiency symptoms are noticed. While field scouting canola, look for one or more of the following sulphur deficiency symptoms:

- cupping upward of leaves;
- interveinal yellowing of the newest leaves in earlier stages of growth (Figure 1);
- spindly plants;
- cupped leaves with purpling on the underside, usually at the fringes;
- pale yellow flowers;
- poor pod development and poor filling in advanced stages of growth; and
- delayed maturity.

Figure 1: Symptoms of Sulfur Deficiency at the Rosette Stage (Left), Bolting Stage (Centre) and Flowering Stage (Right) Source: International Plant Nutrient Institute

Research has shown that sulphate-sulphur (ammonium sulphate) can be applied any time after seeding until about the 10-per-cent bloom stage to correct a deficiency in canola or mustard. However, the earlier the ammonium sulphate is applied, the better the chance of recovering the yield. Hence, frequent field scouting during early growth stages is critical for optimizing yield. If sulphur deficiency symptoms are noticed in part of a field, ammonium sulphate should be applied to the whole field to minimize the risk of yield loss due to marginal deficiencies of sulphur.

For more information, check out *Sulphur Fertilization in Crop Production* on the Saskatchewan Ministry of Agriculture website at: www.agriculture.gov.sk.ca/Production - scroll down to Crops-Fertilizer/Nutrients; or call the Agriculture Knowledge Centre at: 1-866-457-2377 ☼

Forage Crop Production Outlook 2008

By Michel Tremblay, Provincial Specialist, Forage Crops

Saskatchewan has a large forage industry, with seeded grasslands and rangeland accounting for approximately 20 million acres. Forage production from these acres is a key input into the province's sizeable cow-calf industry. Forage acres in Saskatchewan have been climbing for several years, with pasture acreage increasing from 3.5 million acres in 2001 to 4.9 million acres in 2006. Harvested hay acres increased from 3.1 million acres to 4.3 million acres during the same time period (Table 1).

Forage growers and researchers have long known the importance of timing and amount of precipitation, and its effect on forage production. L.M. White (1985) evaluated the yield of several dryland cool season grasses in four locations in the Northern Great Plains. He determined that over half of all variability observed in grass yields was due to April and May precipitation. R.E Stitt (1958) determined that, of the seven grasses grown at Moccasin, Montana, 88 per cent of yield variation was due to April and May precipitation.

Early spring precipitation will largely determine forage yields. Soil moisture levels in the southwest region of the province were low throughout the winter, and many areas received average to below average precipitation early this spring, reducing forage production potential. Cold temperatures have reduced evaporative moisture losses, but have also slowed grass development, which is more than two weeks behind normal in many areas.

Forage crop yields increased over the past five years, recovering from a multi-year drought in the early part of the decade. Provincially, hay yields in the past four years were above average. The average hay yield on a provincial basis from 2001 to 2006 was 1.05 ton per acre.

Table 1. Saskatchewan hay acreage, production and price, 2001-2007

Year	Seeded Acreage	Harvested Acreage	Yield	Price $ per ton
2006	5,346,657	4,300,000	1.4	42.00
2005	5,150,000	4,450,000	1.4	53.00
2004	4,800,000	4,375,000	1.2	72.00
2003	4,500,000	4,075,000	0.8	89.00
2002	4,275,000	3,300,000	0.7	124.00
2001	3,950,000	3,050,000	0.8	86.00

Source: Saskatchewan Ministry of Agriculture

Many producers found that their feed stacks were depleted more than expected during the long winter of 2007-2008, resulting in feed reserves lower than anticipated this spring.

(Continued on page 5)

Forage Crop Production Outlook 2008
(Continued from page 4)

Traditionally, annual forages have been used as a flexible feed source when supplies of perennial forages become short. With high grain prices, there may be less inclination to make green feed out of a potentially lucrative grain crop.

Feed carryover from 2007 is down, crop development in 2008 is delayed, and moisture was limited in many regions in early spring, pointing to reduced forage production this year. Prices for forage, which have languished well below the long-term average of $62 per ton for grass/alfalfa hay, have begun to move up recently.

References:
White, L. M., Stand age, precipitation, and temperature effects on forage yields. pp. 39-43, JRM, vol. 38(1), 1985.
Stitt, R. E. Factors affecting yield and quality of dryland grasses. pp.136- 138. Agron. J. vol. 50, 1958. ✡

Ug99 Stem Rust Update

By Blaine Recksiedler, Provincial Specialist, Cereal Crops

A new form of stem rust has emerged and has the potential to threaten global wheat yields. According to Nobel laureate Norman Borlaug, "If we fail to contain Ug99, it could bring calamity to tens of millions of farmers and hundreds of millions of consumers."

Figure 1. Stem Rust
Source: Dr. Curt McCartney

The last major stem rust (Figure 1) epidemic in North America occurred in the 1950s, destroying up to 40 per cent of the spring wheat crop. It is important to note that the causal pathogen, *Puccinia graminis* f. sp. *tritici*, is virulent on both wheat and barley.

The new pathogen was first found in Uganda in 1999, hence the name Ug99. Up to 80 per cent of all wheat varieties grown in Asia and Africa, and up to 90 per cent of all wheat varieties worldwide are susceptible to Ug99. While a few Canadian varieties have some level of resistance, most do not. Two varieties, Peace and Cadillac, have tolerance to Ug99. A new variety, BW 867, which was recommended for registration in February 2008, also has tolerance.

(Continued on page 6)

Ug99 Stem Rust Update
(Continued from page 5)

In April 2007, Ug99 spread from Africa to Yemen on the Arabian Peninsula. In March 2008, it was found in major wheat growing areas in Iran.

In the 1980s, a yellow (stripe) rust race spread from East Africa, across the Red Sea to Yemen. It then moved into the Near East and Central Asia, causing serious loss along its path in Egypt, Syria, Turkey, Iran, Iraq, Afghanistan and Pakistan. It took only four years to reach South Asia. Experts are predicting a similar pathway for Ug99. However, they are not ruling out a more direct route on air currents to the Indian subcontinent. According to the Food and Agriculture Organization of the United Nations, countries in the predicted pathway grow approximately 25 per cent of the global wheat crop. It is quite likely that this strain, or its variants, will eventually be found throughout the world.

An international consortium, Borlaug Global Rust Initiative (BGRI), has been formed to combat Ug99, with funding from various agencies around the world, including the Canadian International Development Agency.

The Bill and Melinda Gates Foundation recently announced a $26.8 million grant to Cornell University to launch the Durable Rust Resistance in Wheat project. Fifteen institutions from around the world will combine forces to combat Ug99 and its variants. Dr. Tom Fetch, stem rust pathologist with Agriculture and Agri-Food Canada (AAFC), is a collaborator on the project. This funding will supplement AAFC's ongoing commitment to find solutions to Ug99. Plant breeders and pathologists around the world are sending lines to screening programs in affected areas to gauge the level of resistance. In 2008, approximately 1,400 wheat and barley lines from Canada will be screened against Ug99. Other research priorities will include identification of new sources of resistance, molecular marker development and doubled-haploidy technology to hasten the employment of resistance genes.

For more information on the BGRI, see their website at www.globalrust.org/. ✿

Management of Fungicide Resistance for Ascochyta in Chickpeas

By Faye Dokken, Provincial Specialist, Plant Diseases

Ascochyta blight, caused by the fungal pathogen *Ascochyta rabiei*, is considered the most damaging chickpea disease worldwide. Under favourable disease conditions, chickpea growers have experienced significant yield and seed quality losses. Research has shown that an early fungicide application can help delay the onset of disease. Subsequently, growers usually make another application to desi varieties (e.g. CDC Cabri), one to two more applications to resistant kabuli varieties (e.g. CDC Frontier), and up to six additional applications to susceptible kabuli varieties (e.g. CDC Xena).

(Continued on page 7)

Management of Fungicide Resistance for Ascochyta...**(Continued from page 6)**

Proper timing is essential, and fungicides that have been applied before the fungus penetrates the plant are the most efficacious, and, if applied prior to rainfall events, will protect plants from spore germination/penetration by rain-splashed inoculum.

Figure 1: Ascochyta on chickpea
Source: Saskatchewan Agriculture

Chickpeas should be scouted early for ascochyta blight: every three to seven days starting at the seedling stage. Early results of the 2008 Chickpea Ascochyta Sentinel Plant Project suggest that ascochyta inoculum was released this spring as early as the second week of May. This means that disease potential has been present for a while already, and growers should be prepared to apply a preventative fungicide at or even before the seven- to 10-node stage. Symptoms of ascochyta are tiny light brown to dark brown spots, expanding into lesions with distinct margins on lower leaves and progressing upwards to all above-ground parts (Figure 1). Black fruiting bodies (pycnidia) are found within lesions, indicating spore production with the potential to cause additional infections. In chickpea fields where ascochyta is spreading quickly, circular patches of dead and dying plants may be observed.

There are five foliar fungicides registered for control of ascochyta blight on chickpea: Bravo 500, Lance, Proline 480 SC and two Group 11 (strobilurin) products, Quadris and Headline Duo. Strobilurins are valuable, effective, broad-spectrum fungicides with a single mode of action.

The risk of developing strobilurin-resistance in chickpea is high because ascochyta: (1) is genetically diverse, (2) reproduces sexually with airborne spores, (3) reproduces asexually with multiple short infection cycles during the growing season, and (4) requires several fungicide applications per year, which increases selection pressure for resistant pathogen populations.

Isolates of *Ascochyta rabiei* collected in Alberta and Saskatchewan in 2006 and 2007 and assessed against a strobilurin product have demonstrated widespread insensitivity (resistance) to the fungicide. Loss of effective fungicides due to resistance can be very costly to growers, and proper management is critical to reduce selection pressure. Rotate strobilurins with non-strobilurins, or use a registered tank-mix of products from different fungicide groups. Remember to check product labels for maximum applications per growing season and for pre-harvest interval timelines.

For more information, refer to the Saskatchewan Ministry of Agriculture website at: www.agriculture.gov.sk.ca/Production - scroll down to Crops-Disease and look for *Ascochyta Blight of Chickpea.* ✿

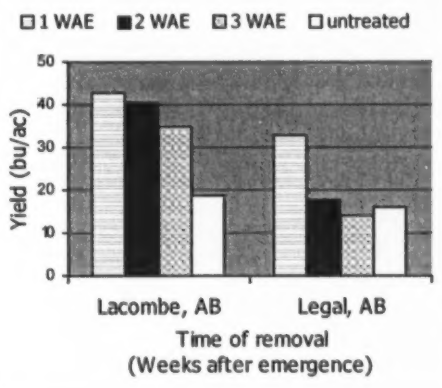
Weed Control When the Pre-Emergent Treatment is Missed

By Clark Brenzil, Provincial Specialist, Weed Control

The cooler-than-normal spring and the lack of rainfall in many places has resulted in variable weed emergence in relation to crop emergence this year. Where producers were able to apply burn-off products, crops could be well ahead of the weeds. But, if the burn-off was missed, there could be large winter annual weeds waiting for crops to emerge. This puts additional pressure on post-emergent herbicide products to deal with the onslaught. There are several management options for producers to use in this situation.

If weeds are emerging with or before the crop, the following measures are needed to insure that weeds do not result in significant yield losses:

Figure 1. Effect of Time of Removal on canola yield – N. Harker, AAFC Lacombe



- **Apply as early as possible.** Early application has been shown to provide greater yield increases than waiting for later emerging weeds to apply herbicides (Figure 1). At populations of 50 plants per square metre, wild oats emerging with the crop will result in nine per cent more yield loss than populations emerging when the crop is at the one-leaf stage. If the wild oats are at the one-leaf stage when the crop emerges, yield loss increases another 13 per cent. Barley responds similarly, at five per cent greater yield loss from the crop emerging with the weed compared to ahead of the weed, and an additional two per cent yield loss if the crop emerges when the weed is at the one-leaf stage.
- **Keep water volumes up** to the maximum of the recommended range. High weed populations will make good coverage on each weed difficult at low water volumes.
- **Don't shave rates**. With high commodity prices, the 2008 growing season is not the year to cut rates, since even a small loss of yield can result in a large loss of income.
- **Choose herbicides that can be applied at an early crop stage**. Herbicides vary in the stages at which they can be applied on the crop. Beware of early phenoxy (2,4-D and MCPA) treatments, since applying prior to tiller initiation can result in yield losses up to 25 per cent. The exact timing of crop tiller initiation is difficult to gauge from the external features of the plant, but usually coincides with the four-leaf stage.

(Continued on page 9)

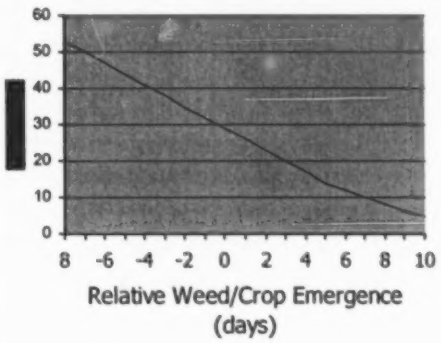
Weed Control when the Pre-emergent Treatment is Missed **(Continued from page 8)**

- **Avoid antagonism**. Ions and particulate matter in water are often considered, but tank mixes of certain products can cause antagonism. Follow label recommendations for tank mix combinations to avoid difficulty.

If crops are emerging well ahead of the weeds, producers should consider the following:

- Most crops (other than flax and low-lying pulse crops) will not suffer significant yield losses if weeds emerge more than a week after the crop (Figure 2). Any herbicide application at this point will be made for personal satisfaction not economic benefit. Even peas will be reasonably competitive without herbicides once they are well-established.

Figure 2. Yield Loss vs. Relative Time of Emergence – adapted from O'Donovan, ARC,



- The short stature, less competitive crops such as flax, beans, lentils and chickpeas require a judgment call to determine if the weed population is heavy enough to out-compete the crop. In flax, one wild oat per square metre can reduce yield by six per cent, which, depending on the price for the crop, could make spraying economical.
- To increase the safety of applications to non-competitive crops in the later end of the recommended stages, consider the following:
    - Use of very high rates of water – 15 to 20 U.S. gallons per acre – will reduce the risk of injury.
    - Some herbicides have reduced rate recommendations for very small weeds. Use this to kill the initial flush of small weeds with reduced risk of injury to the crop.
    - Avoid application in high temperatures. Application in the evening will allow the crop to recover prior to heat stress during the following day.

The 2008 growing season has already presented many challenges for producers. As a result, weed control expectations may need to be lowered. ✿

Organic Weed Control and Finding That Optimum Balance

By Chantal Stumborg, Provincial Specialist, Organic Crops

Organic farmers integrate weed control into their cropping systems through various practices, including effective crop rotations, increased seeding rates, the use of clean seed with good germination and vigour, and tillage. Tillage is one of the most effective tools for weed management in a grower's arsenal, but it may be ineffective or even cause yield reductions if used incorrectly. The weed control objective for organic growers is not to eradicate weeds, but maintain populations at an acceptable level that allows the crop a competitive advantage.

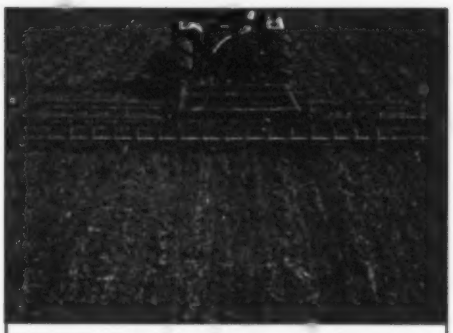


Figure 1: Post-emergence harrowing
Source: Eric Johnson, AAFC

Controlling weeds with tillage is a balancing act to minimize soil erosion while increasing soil quality and weed control, and generally involves pre-seeding tillage in the spring. A post-seeding tillage operation can be effective, depending on weed species, crop competitiveness, crop stage, crop uniformity and climatic factors.

When considering the feasibility of an in-crop tillage operation, first determine the crop and weed competitiveness and the stage of the crop. Control weeds in the early crop stages, and keep in mind that weeds that share a growth habit with the crop will be difficult to control. In some cases, effective weed control may require two or three post-emergent tillage operations, but the cost in fuel and the operator's time may offset the yield benefits from suppressing the weeds.

In-crop tillage is commonly performed with a rod-weeder and/or tine harrow (Figure 1). Both control weeds by either burying them or physically removing them from the soil, and weed selectivity can be adjusted by increasing or decreasing the depth of burial. Harrow speed and direction will have a minimal effect on weed selectivity, but the harrow tines should be set so that the crop rows are still visible. Studies done by Eric Johnson of Agriculture and Agri-Food Canada (AAFC) have shown that pre-emergent rod-weeding done three to seven days after seeding field pea provided good weed control when seeding was delayed until mid-to-late May. Keep in mind that tillage conducted under cool, moist conditions is less effective than tillage done in hot, dry conditions.

Post-emergence tillage is most effective on shallow-rooted annual weeds such as Russian thistle, wild mustard, wild buckwheat, green foxtail, lamb's quarters and pigweed, and less effective on perennial weeds and deep-rooted annuals.

(Continued on page 11)

Organic Weed Control and Finding that Optimum Balance **(Continued from page 10)**

Post-emergence tillage is recommended in wheat and barley from the two- to four-leaf stage, and in lentil and field pea in the seedling stage (no more than 10 cm tall) and using tine harrows only. It is not recommended for small-seeded crops such as mustard and flax. ✿

Downy / Japanese Brome Update

By Grant Holzgang, Laboratory Supervisor, Crop Protection Lab

Two species of brome grass, Japanese brome (*Bromus japonicus*) and downy brome (*Bromus tectorum)* continue to be an issue for in-field identification, as represented by their submissions to the Crop Protection Laboratory this year.

Both species form shoots in a cluster arising from a crown, and both flower from May to July. While each species may act as either an annual or winter annual, depending on climatic conditions, field observations across the Canadian Prairies suggest that Japanese brome is found more often growing as an annual among spring seeded crops.

The following comparison of the two species refers to plant structures shown in Figure 23.

The first glume is one nerved in downy brome versus three to five nerved in Japanese brome. The second glume is three nerved in downy and five to nine nerved in Japanese. Lemmas are seven nerved in downy, and mostly nine nerved (occasionally seven to 11) in Japanese, and usually awned. In downy, the awns are usually 10 to 18 mm long while, in Japanese, the awns are usually eight to 12 mm long and distinctively bend away from the seed at maturity.

While scouting in the field, several seedlings can be dug up and the seed coats (usually still attached to the seedling below ground) can be examined with a hand lens for these characteristics.

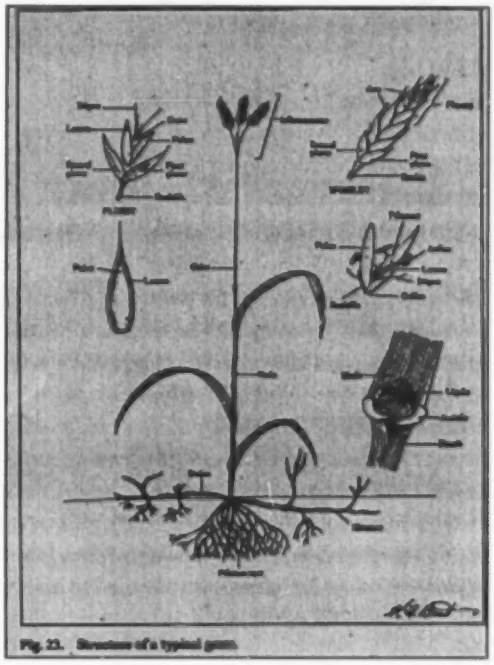


Fig. 23. Structure of a typical grass.

(Continued on page 12)

Downy / Japanese Brome Update **(Continued from page 11)**

Figure 1. Ligules of Japanese brome (L) and downy brome (R) plants grown together illustrate their relative length. Ligule serrations on Japanese brome in this picture also appear more blunted than those of downy brome.
Source: Saskatchewan Agriculture

At later stages, the two species can be compared based on vegetative structures. Ligules of downy are usually one to four mm long compared to one-half to two mm long for Japanese (Figure 1).

Downy's leaf blades are from one to 19 cm long and one to five mm wide, while Japanese leaf blades are two to 20 cm long and one to seven mm wide. Downy brome usually has hairs that are directed backwards or downwards, with hairs somewhat sparser on the culms and upper sheaths. Japanese brome leaf blades are covered with soft, thin hairs and the sheaths are densely long-haired.

At flowering time, the whole panicle of downy brome is more compact and often nodding, whereas Japanese's panicle is more open and erect with branches bending. Downy's spikelets have four to seven flowers which overlap, while Japanese has six to 13 flowered spikelets. ✿

Do you have more questions about crops, livestock, nutrient management or farm business management?

Contact friendly and knowledgeable staff at the
Agriculture Knowledge Centre
Toll-free helpline **1-866-457-2377**
Or visit the Saskatchewan Agriculture website
at www.agriculture.gov.sk.ca

Cutworm Update

By Scott Hartley, Provincial Specialist, Insect and Vertebrate Pests

Cutworms have been the main widespread insect pest this spring. Reports of infestations have come from producers and industry agrologists in the northwest, west-central, southwest and south-central regions. In most situations, the cutworms are species that over-winter as small larvae (e.g. army and dingy cutworms) and, therefore, are larger at this time of year. Larger, later instar cutworms can cause more extensive damage due to their size, which is associated with increased food consumption. Cooler, wetter conditions in some areas may have reduced the insect activity and damage. Manitoba Agriculture, Food and Rural Initiatives has noted infestations of dingy cutworms in areas of Manitoba.

In 2007, dingy cutworms (Figure 1) were a problem in eastern regions of Saskatchewan, so producers should be aware of potential cutworm problems when scouting fields.

There have also been reports of other cutworms such as the red-backed (Figure 1) and pale western species. ☼

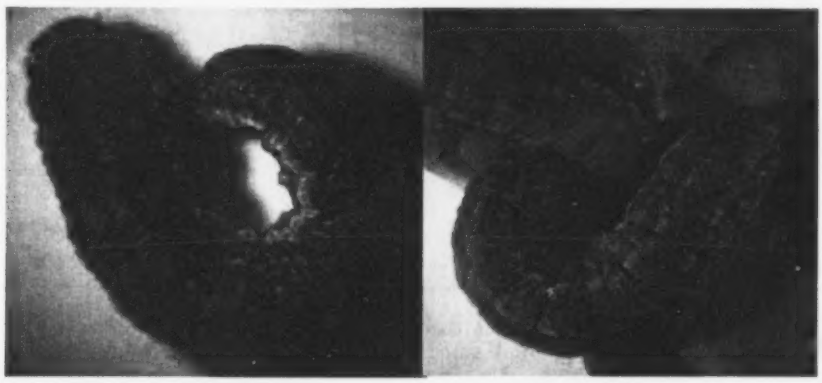


Figure 1. Red-backed cutworm (Left) and Dingy Cutworm (Right).
Source: Saskatchewan Agriculture

Weed Control in Clearfield Lentil

By Dale Risula, Provincial Specialist, Special Crops

Clearfield lentil varieties were developed using varieties from the Crop Development Centre and bred to include tolerance to Clearfield herbicides. They are non-GMO varieties; therefore, they retain marketability throughout the world.

(Continued on page 14)

Weed Control in Clearfield Lentil **(Continued from page 13)**

Table 1 shows some agronomic ratings of Clearfield varieties currently available to Saskatchewan producers and compares their yield to CDC Milestone lentil.

Table 1:

	CDC Impact CL	CDC Imperial CL	CDC Improve CL
Type	Small red	Extra small red	Large green
Yield per cent of CDC Milestone	85	90	89
Resistance to *ASCOCHYTA*	Good	Good	Fair
Resistance to *ANTHRACNOSE* (race 1)	Poor	Good	Very Poor
Maturity	Early	Early	Medium
Seed Weight (g per 1,000 seeds)	34	30	67

(Source: Saskatchewan Agriculture)

In conventional lentil, the herbicide choices to control broadleaf weeds include Sencor, Trifluralin and Edge. More herbicide choices are available to control grassy weeds.

Clearfield varieties have the choice of three additional herbicides, including Odyssey, Odyssey DLX and Solo. These herbicides are designed to control both broadleaf and grassy weeds with a one-pass application. The timing of application also differs from conventional herbicides such as Sencor. With conventional lentil, the timing for application of Sencor is in the one- to four- (above ground) node stage. Clearfield herbicides may be sprayed from the one- to six- (above ground) node stages. Some Clearfield herbicides are also designed to provide a residual effect and control flushing weeds for an extended period of time after application.

Recent research at the University of Saskatchewan by Dr. Steve Shirtliffe and Leah Fedoruk (M.Sc. candidate) shows that timing of weed control in lentil is very important for obtaining highest possible yields. Studies show that weeds must be controlled by the five- to six- (above ground) node stage and the crop kept weed-free until the 10- (above ground) node stage to obtain best results. Clearfield herbicides are able to control later flushes of weeds which lead to higher yields. The weed density and growth stages of the weeds may have some influence on the efficacy of the herbicides. However, weed control during this crop stage is essential. The study found that any weeds germinating after the 10- (above ground) node stage of lentil has little impact on the yield of the crop.

The important message is to spray before Clearfield lentil surpasses the six- (above ground) node stage. Application around the five- to six- (above ground) node stage is recommended to best control weeds and flushes of weeds during the critical period of weed control, and to prevent yield loss. ✿

The ***Crop Production News*** is a regular publication of the
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